UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202 – 2733

February 19, 2020

Mr. Miguel Montoya
Quality Assurance Officer
New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, NM 87502-5469

Dear Mr. Montoya:

We have reviewed the revised Quality Assurance Project Plan (QAPP) entitled "*Lower Animas Watershed Based Plan Implementation Projects"* for Clean Water Act 319 Cooperative Agreement C6-996101-17. I am pleased to inform you that it was approved on February 19, 2020.

This new QAPP will expire on December 31, 2021 as requested. Should there be any changes to the QAPP at any time, please submit a revised document to EPA for approval. If the project continues under a new cooperative agreement and there are no substantive technical or programmatic changes, please submit a letter stating that no changes are needed. The letter or revised document is due at least 60 days prior to the expiration date.

Attached is the completed QAPP signature page for your records. In any future correspondence relating to this QAPP, please reference QTRAK #20-139. If you have any questions, you may contact me at (214) 665-2773.

Sincerely,

Leslie C. Rauscher

Leslie Rauscher
Project Officer
State/Tribal Programs Section

Attachment; sent via email, no hardcopy to follow.

Project Quality Assurance Project Plan

for

Lower Animas Watershed Based Plan Implementation Projects

Prepared by
Mountain Studies Institute
P.O. Box 426
Silverton, CO 81433

On Behalf of
San Juan Watershed Group
Project Period: September 01, 2017- December 31, 2020

Prepared for
US EPA Region 6
1201 Elm Street, Suite 500
Dallas, Texas 75270

Submitted by:
New Mexico Environment Department
Surface Water Quality Bureau

APPROVAL PAGE

Alan Klatt — 1-21-2020
Alan Klatt
Project Officer, SWQB, Watershed Protection Section — Date

Miguel Montoya — 1-21-2020
Miguel Montoya
Quality Assurance Officer, SWQB, Monitoring Assessment and Standards Section — Date

Abe Franklin — 1/21/2020
Abe Franklin
Program Manager, SWQB Watershed Protection Section — Date

Leslie Rauscher — 2/19/2020
Leslie Rauscher
Environmental Protection Specialist, WQPD, EPA Region 6 — Date

~~Barbara Schrodt~~ Wendy Smith — 2/19/2020
~~Acting~~ Chief, State and Tribal Programs Section, ~~WQPD~~, EPA Region 6 — Date

WPAS

Table of Contents

Acronyms

AWP- Animas Watershed Partnership

BMP – Best Management Practice

CAP – Conservation Activity Plan

CDPHE – Colorado Department of Public Health and Environment

CFU – Colony Forming Unit

EQIP – Environmental Quality Incentives Program

EPA – US Environmental Protection Agency

GI – Green Infrastructure

HUC – Hydrologic Unit Code

LAWBP – Lower Animas Watershed Based Plan

LID – Low Impact Development

MSI – Mountain Studies Institute

NMED – New Mexico Environmental Department

NRCS – USDA Natural Resources Conservation District

PQAPP – Project Quality Assurance Project Plan

QA – Quality Assurance

QAPP – Quality Assurance Project Plan

QC – Quality Control

SJSWCD – San Juan Soil and Water Conservation District

SJWG – San Juan Watershed Group

SOP – Standard Operating Procedures

STEPL – Spreadsheet Tool for Estimating Pollutant Loads

SUIT – Southern Ute Indian Tribes

SWQB – NMED Surface Water Quality Bureau

TMDL – Total Maximum Daily Load

WPS – NMED SWQB Watershed Protection Section

Introduction

The San Juan Watershed Group (SJWG) has prioritized nutrient enrichment and bacteria pollution as the most problematic water quality issues in the New Mexico portion of the Animas River watershed. Nutrients were identified as a problem in the watershed in 2002, when severe algae blooms choked the river and sparked widespread concern about eutrophication. A TMDL for nutrients was developed for the Estes Arroyo-San Juan River reach in 2006, and a TMDL for total phosphorus was developed for the Southern Ute Indian Tribes (SUIT)-Estes Arroyo reach in 2013. The Animas was first listed for *E. coli* in 2012, indicating that the river was not meeting its primary contact designated use, which is designed to protect recreation activities "including swimming, bathing, tubing, water play by children, and similar activities where a high degree of bodily contact with water, immersion and ingestion are likely" (CWA Section 304(a)(1)). A TMDL for *E.coli* was developed in 2013. The goal of this work is to implement on the ground projects outlined in the Lower Animas Watershed Based Plan (LAWBP) (SJWG 2016) to reduce nutrient, bacteria, and sediment loads to the Animas and San Juan Rivers.

1.0 PROJECT MANAGEMENT

1.1 Title and Approval Page (EPA QA/R-5 A1) - See page 1.

1.2 Table of Contents (EPA QA/R-5 A2) - See pages 2 - 3.

1.3 Distribution List (EPA QA/R-5 A3)

Melissa May, San Juan SWCD, will serve as the grantee and project manager. Table 1.3 presents a list of the staffing and roles for the Lower Animas watershed based plan implementation projects, including the relationship between EPA staff, NMED, San Juan SWCD, SJWG, NRCS, MSI, and restoration subcontractors.

Table 1.3: Distribution List and Project Roles and Responsibilities

Name	Organization	Position/Role	Responsibility for	Contact Information
Melissa May	San Juan SWCD	Project Manager	Grant and project manager.	505-334-3090 x5; melissa.may@sanjuanswcd.com
Alyssa Richmond	SJWG	Project Coordinator	Coordinate workplan and management of projects 1-4. Review data/reports submitted by subcontractors.	210-286-1525 Alyssa.Richmond@sanjuanswcd.com
Scott Roberts	MSI	Monitoring Subcontractor	Pre- and post-construction vegetation surveys for projects 3 and 4.	970-387-5161; scott@mountainstudies.org
Mark Oliver	Basin Hydrology	Restoration Subcontractor	Oversee construction management of projects 1-3.	970-903-0366 mark@basinhydrology.com
Chambliss Lantana	NRCS	Project Partner	Implement CAP and EQIP for project 4.	505-634-5619 Chambliss.Lantana@usda.gov
Alan Klatt	NMED SWQB	SWQB Project Officer	Certify project work for payment; liaison between SJWG and NMED/EPA staff	505-827-0388 Alan.klatt@state.nm.us
Miguel Montoya	NMED	Quality Assurance Officer	Ensure high quality of work is maintained throughout entire project, review and approved QAPP	505-826-3794 Miguel.Montoya@state.nm.us

1.4 Project Organization (EPA QA/R-5 A4)

Project Officer – Alan Klatt, SWQB/WPS, will be responsible for certifying invoices on behalf of NMED in accordance with the Scope of Work and Contract Agreement 18-667-2060-0006.

Quality Assurance Officer – Miguel Montoya, SWQB/MASS, will ensure that a high quality of work is maintained throughout the entire project.

Project Manager – The project manager will be Melissa May, Administrator - San Juan Soil & Water Conservation District (San Juan SWCD). Ms. May will coordinate with Alyssa Richmond (San Juan Watershed Group coordinator and project coordinator for LAWBP Implementation Projects) on project implementation and stakeholder engagement, with San Juan SWCD on the budget and contract items, and with subcontractors to assure that all contractual items are met. Quarterly fiscal and technical progress reports and final project report will be submitted to NMED by Alyssa Richmond, the project coordinator.

Project Coordinator – Alyssa Richmond the SJWG Coordinator, will serve as project coordinator and will have lead responsibility for preparing the detailed project work plan. Alyssa Richmond will be responsible for coordinating with the NMED project officer, reviewing data and reports submitted by subcontractors, preparing quarterly and final reports to NMED, facilitating stakeholder engagement, scheduling workgroup meetings, coordinating with SJWG contractors and partners, and conducting community outreach.

Restoration Subcontractor - Mark Oliver, Basin Hydrology, will design, coordinate and oversee the construction activities management projects 1 - 3. Mark Oliver has 24 years of experience with 319 implementation work and over three decades of experience using hydrologic and topographic survey and monitoring methods.

Monitoring Subcontractor – Scott Roberts, Mountain Studies Institute (MSI), will develop the QAPP and conduct pre- and post-construction surveys for management project 3 and 4 to document revegetation recovery and effectiveness. MSI's staff has, combined, several decades of experience with vegetation monitoring, which includes methods related to forestry, riparian, wetland, range, and alpine systems. MSI has also experience establishing repeat photography points for long term ecological and forestry monitoring.

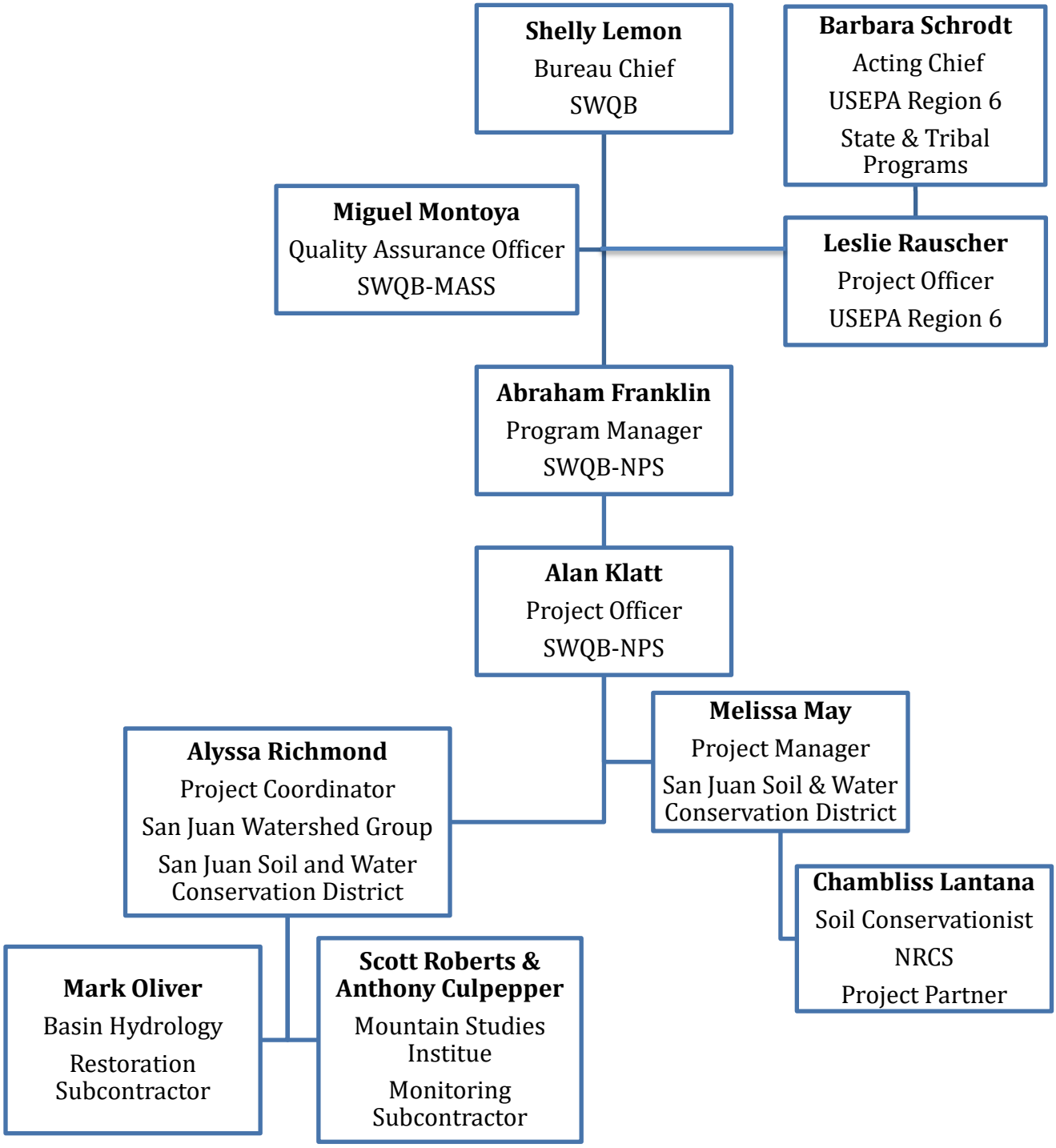

Figure 1.4: Organization Chart

1.5 Project Background, Overview, and Intended Use of Data (EPA QA/R-5 A5)

1.5.1 Project Background

The project area is the Animas Watershed (HUC 14080104) and consists of two segments of the Animas River. The segments are Animas River from Estes Arroyo to Southern Ute Indian Boundary (NM Standards Segment 20.6.4.404) and Animas River from San Juan River to Estes Arroyo (NM Standards Segment 20.6.4.403). The Animas watershed within New Mexico is approximately 36 miles long, 270 square miles and consists of six 12-digit Hydrological Unit Code (HUC) units. The proposal consists of four individual Best Management Projects (BMPs) and two outreach and education programs. Three of the BMPs will be located along the Animas River and one BMP will be located on Knowlton Arroyo, a tributary to the Animas River. The four BMPs will be located within the following HUC units: Estes Arroyo – Animas River HUC (140801041004), Flora Vista Arroyo – Animas River HUC (140801041005) and City of Farmington – Animas River HUC (140801040006). The education program will focus on urban stormwater management education and will focus on the urban areas in Aztec, Farmington and San Juan County and the outreach program consists of on-going coordination and outreach activities by the SJWG Coordinator throughout the entire watershed. The LAWBP Section 2 Watershed Background provides detailed information on the Animas Watershed and the subsection Watershed Focus Areas provides detail on each of the six HUC12 units (SJWG 2016). The map below depicts the location of the four Best Management Projects. The projects are identified accordingly as listed in Table 1.5.1 and on figure 1.5.1 1 is E7, Project 2 is CF1-2, Project 3 is E1 and Project 4 is FV3.

Table 1.5.1.: Project Components

Project Component Type	Management Project Number	Name	Location	Map Label
BMP	1	Lower Animas Irrigation Ditch Siphon Crossing at Knowlton Arroyo	Knowlton Arroyo, a tributary to the Animas River	E7
	2	Ranchmans Terrell Diversion Improvement and Flora Vista River and Riparian Restoration	Animas River	CF1-2
	3	Riparian fence, filter strip and streambank stabilization along Animas River	Animas River	E1
	4	Four Corners Equine Rescue Manure Management	Property approximately 500 feet from the Animas River	FV3
Educational Program	*n/a*	Farmington Low-Impact Development, Green Infrastructure, and Water Harvesting Workshop	*(will focus on urban areas of Aztec, Farmington, and San Juan County)*	*n/a*
Outreach Program	*n/a*	SJWG outreach activities	*(watershed-wide)*	*n/a*

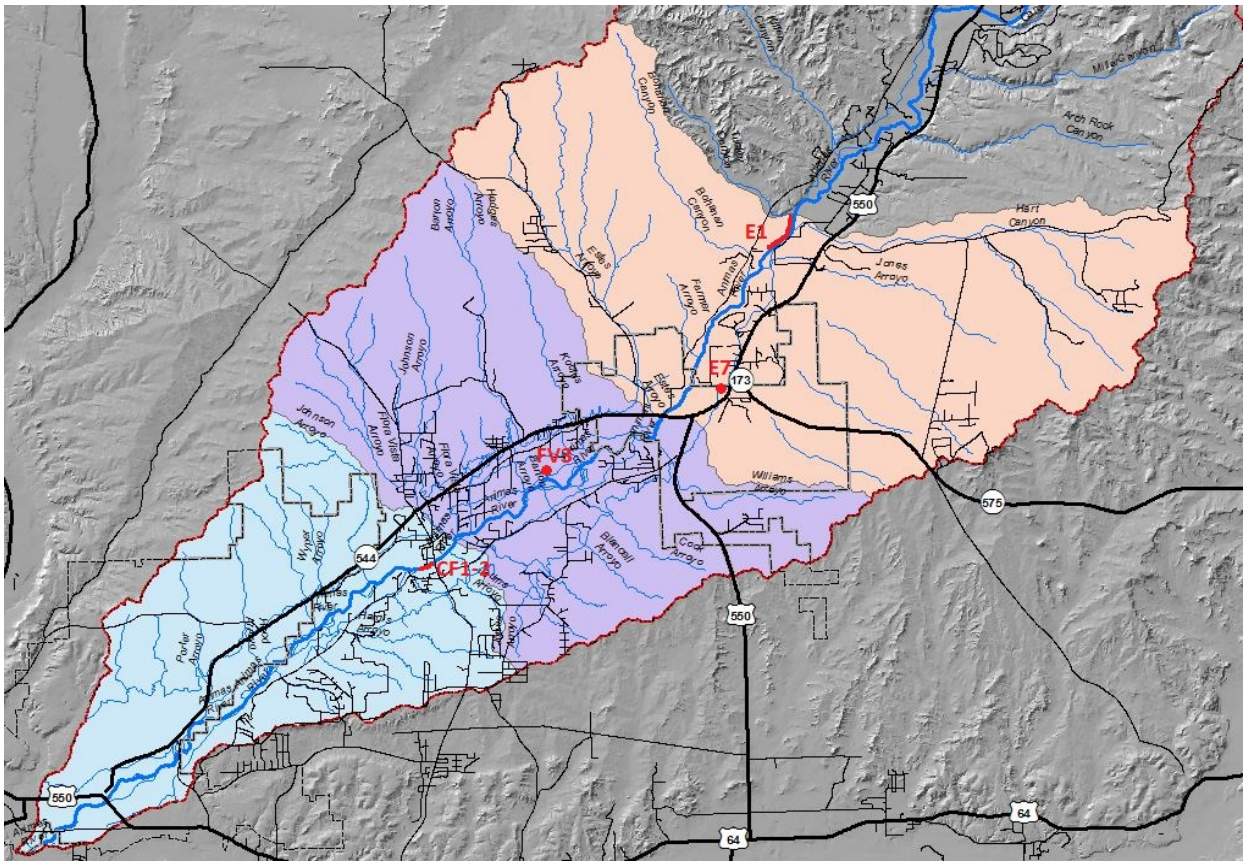

Figure 1.5.1: Map of project areas.
Note: CF1-2 and E1 will be located on the Animas River. FV3 will be located approximately 500 feet from the Animas River. E7 will be located on Knowlton Arroyo, a tributary to the Animas River.

1.5.2 Project/Task Description and Schedule (EPA QA/R-5 A6)

As defined by Agreement Number 18 667 2060 0006 (MOA between the New Mexico Environment Department and the San Juan Soil and Water Conservation District), the San Juan Watershed Group will complete the following management projects. These projects will be completed in the time listed in Table 1.6. Project locations are displayed in Figure 1.5.1.

Table 1.5.2: Summary and timeline of grant tasks

Task		Sub Task		Timeline*	Responsible Person/s	Description
Task 01	Management and implementation of Projects 1-4	1.1	Project Design	Q4 2017	Mark Oliver, NRCS	Conduct surveys to develop construction plans for Projects 1-3
		1.2	Project Construction	Q4 2017 - Q3 2018	Mark Oliver, NRCS, Contractors	Contractor selection and project construction
		1.3	Post Construction Survey	Q3/4 2018	Mark Oliver, NRCS, MSI	Establish post construction baseline data for Projects 1-3
		1.4	Conservation Action Plan and EQIP Implementation	Q1 2018 - Q2 2020	NRCS	Develop CAP for Project 4, Four Corners Equine Rescue, execute EQIP contact, and oversee completion of CAP
Task 02	Environmental Evaluation and Modeling of Management Projects 1-4	2.1	Develop QAPP	Q4 2017	MSI	Develop QAPP and document methods to be used to evaluate post-construction revegetation and pollutant load reductions
		2.2	Pre-construction Site Surveys	Q2 2018	MSI, Basin Hydrology, SJWG	Conduct topographic and vegetation surveys, and establish repeat photo points, prior to construction/implementation for Projects 1-4
		2.3	Post - construction Site Surveys	Q4 2018 - Q2 2020	MSI, Basin Hydrology, SJWG	Conduct 2 post-construction surveys at the four Management Projects to evaluate any changes to constructed topographic features, structural integrity of fences and grade control features, revegetation success, for load reduction modeling. photo-documentation, and other appropriate measures necessary
		2.4	Load Reduction Modeling	Q4 2018 - Q2 2020	MSI, Basin Hydrology	Model pollutant load reductions for E. coli bacteria, Nitrogen, Phosphorus and sediment for Year 1 and Year 2 Post-construction periods using STEPL or other appropriate models.
Task 03	Farmington Low Impact Development, Green Infrastructure, and Water Harvesting Workshop	3.1	Urban Watershed Assessment and Site Selection	Q2 2018	SJWG, Stream Dynamics (SD)	Visit multiple locations in and around Farmington and Aztec to assess the current status of storm water practices and select a site for the demonstration project that will occur during the workshop.
		3.2	Workshop Evaluation	Q2 2018	SJWG, Stream Dynamics (SD)	Develop an evaluation form for the Workshop attendees to assess the effectiveness and applicability of the workshop content and presenters.
		3.3	Workshop Planning	Q3/4 2018	SJWG, Stream Dynamics (SD)	Select a venue for the workshop; identify workshop participants and send announcements; register attendees; select and contract with food service provider; and acquire workshop material and assemble workshop packets.
		3.4	Workshop	2019	SJWG, Stream Dynamics (SD)	Conduct the two day workshop for 40 attendees.
		3.5	Review Workshop Success	2019	SJWG, Stream Dynamics (SD)	Review and tabulate the attendee workshop evaluation forms.
Task 04	Project Coordination, Outreach, and Education	4.1	Project Coordination	Q4 2017 - Q2 2019	SJWG	Ensure all implementation project elements outlined in Tasks 1-3 stay on schedule. Coordinate between landowners, responsible persons listed above, and all subcontractors to ensure that deliverables are completed on time and within budget.
		4.2	SJWG Meeting and Stakeholder Engagement	Q4 2017 - Q2 2020	SJWG	Report on Management Project progress at monthly SJWG meetings, engage stakeholders and encourage participation by new stakeholders.
		4.3	Grant Reporting	Q4 2017 - Q2 2020	SJWG	Progress and financial reports to NMED Surface Water Quality Bureau will be prepared quarterly, with a final report deliverable at the completion of the grant.

*Note: *Quarters refer to calendar year; timeline from original workplan may be pushed back to account for delays in preliminary document approvals*

Management Project 1 – E7 Lower Animas Irrigation Ditch Siphon Crossing at Knowlton Arroyo

Substantial channel bed scour, erosion, and sediment sources have been identified in the LAWBP as being related to a siphon located on the Lower Animas Irrigation Ditch where it crosses Knowlton Arroyo, approximately 1000 feet directly west of Hwy 550 at the south end of Rd 2930 just north of Aztec. The poor condition of the siphon requires frequent repairs using a backhoe in the arroyo bed, which can hinder revegetation efforts and cause additional sediment runoff. This project aims to stabilize the siphon structure and eliminate the in-channel disturbance caused by siphon maintenance, which will result in more stable banks, reduced erosion, and reduced sediment and nutrient contributions to the Animas River. To stabilize the channel at the siphon crossing, two cross vane structures using channel sediment fences are proposed to address vertical and horizontal instability. The upstream structure is proposed to be placed at the downstream face of the existing large concrete blocks and set to match the top-of-the-block elevations. Prior to sediment fence installation, additional concrete blocks (top and footer) will be installed to tie into the existing blocks. A second fence structure is to be located approximately 10 feet downstream (and approximately 1 foot lower than the upstream fence) to step down the channel bed elevation. Both fences must be sufficiently keyed into both channel banks; have a 4-foot-wide (min.) fabric secured to the upstream side of each fence (to retain sediment) extending from the top elevation of the fence downward. Each sediment fence will be constructed using standard sediment fence material (*e.g.*, 4-inch diameter by 10 foot long steel posts, 48 inch +/- galvanized horse fencing) and techniques except they will have a cross vane shape and slopes but with no posts or fencing visible. Two 60-foot-long sediment fences are proposed to accommodate the channel width and ensure adequate bank key-in distances. Minor bank shaping and debris removal will be required to allow fence installation and create a more uniform bankfull channel through the reach. The effectiveness of these efforts will be assessed through repeat photo points and surveys of fluvial geomorphology and topography (see data collection elements in section 2.2.3). Based on preliminary calculations from the model, Spreadsheet Tool for Estimating Pollutant Loads (STEPL), bank stabilization associated with this project (100 ft. of eroding bank and 200 ft. of bed) should result in a reduction of 325 tons/year sediment, 520 pounds/year Nitrogen, and 195 pounds/year Phosphorus. Additional benefits include the protection of a public drinking water source; reducing repair activity within the arroyo bottom, allowing stream bottom stabilization; and preventing a blowout that would cause serious downstream erosion and sediment and nutrient transport to the Animas River. A calculation of sediment and nutrient reductions from this project will be refined based on measurements gathered during the topographical survey, such as bank and fencing dimensions.

Management Project 2 – CF1 Ranchmans – Terrell Diversion Improvement and CF2 Flora Vista River and Riparian Restoration

Management Project 2 consists of five coordinated elements along a 0.2 mile reach of the Animas River immediately downstream of County Road 350. Actions associated with the five elements will address known concerns identified by the LAWBP including suspended sediment sources, eroding banks, poor assimilative capacity, and non-native Russian Olive. The five elements are:

1. Ranchmans – Terrell diversion structure;
2. Russian Olive removal;
3. J-hook bank protection for canal on southern bank;
4. J-hooks and bank protection for northern bank; and
5. Large woody check dams.

1. This project will install a large cross vane structure at the Ranchmans-Terrell ditch diversion, replacing the existing cobble push-up dam. This will improve water quality, as the current push-up dam system is comprised of channel bed materials which wash away several times a year, increasing downstream suspended sediments. The push-up dam also increases channel bank stress which has caused the channel to widen because of the loss of bank soils. Consequently, the push-up dam needs to be reconstructed several times a year, resulting in further disturbance to the channel system which re-suspends sediments into the water column.

2. Immediately downstream from the Ranchmans-Terrell diversion on the south bank of the Animas is an area between the river and the irrigation ditch that is dominated by Russian olive. As part of this project, the SJSWCD will remove the Russian olive to allow for reestablishment of native riparian species to enhance riparian health and river resilience within this reach. The removal will be accomplished with funds that the State of New Mexico has granted to the District's 2017 San Juan County Non-Native Phreatophyte Control Fund. Animas Watershed Partnership's 2017-2018 VISTA volunteer will organize and lead volunteers to harvest native willow cuttings and employ a waterjet stinger to plant the cuttings at this site to reestablish native woody vegetation.

3. To complement the installation of the Ranchmans-Terrell diversion structure, this project also includes the survey, design and construction of geomorphically appropriate bank stabilization measures to protect the riverbank and irrigation ditch downstream of the diversion. Due to the narrow width between the river bank and the high sandstone bluffs on the south side of the river where the irrigation ditch and access road are located, river bank erosion is jeopardizing the access road and the ditch and delivering sediment to the river. To address this issue, a series of rock structures will be constructed to reduce near-bank velocities and move the thalweg away from the south bank. Minor areas of eroding bank (encompassing 100-200 lineal feet of bank) will be addressed by simple bank regrading of existing near-vertical banks to a more stable 3:1 slope (+/-) and reapplying salvaged topsoil and sod mats along with installation of willow cuttings.

4. In addition, three J-hook rock structures will be installed downstream of the diversion to protect the north bank in a sustainable and geomorphically appropriate manner. Minor areas of eroding bank (encompassing 100-200 lineal feet of bank) will be addressed by simple bank regrading of existing near-vertical banks to a more stable 3:1 slope (+/-) and reapplying salvaged topsoil and sod mats along with installation of willow cuttings.

5. Near the downstream end of this reach, a secondary high-flow channel exists on the north bank that has the potential to recapture the river and could lead to loss of riparian and floodplain area as the channel goes through its natural adjustment process. Promoting sedimentation and debris trapping within the forming 500-foot-long side channel on the north bank will be accomplished using several large blow-down cottonwoods located on the property owned by the affected property owner. A series of check dams will be constructed using these large trees (root fans attached to 20 to 30 ft. of trunk) and securing while inter-tangling them into the side channel's bed, north bank, and bar to the south. These large woody debris check dams will be inundated well below the bankfull elevation resulting in the capture of large amounts of sediment and organic debris. Over time, this area will become a functional vegetated flood plain with good

assimilative capacity and prevent further bank erosion at this location. The project will preempt conventional engineering approaches that are not compatible with water quality improvement goals, such as installation of bank hardening to prevent additional property loss should the secondary channel recapture the river. This option would only be implemented if other projects come in sufficiently under budget. Figure 1.5.2 depicts project elements.

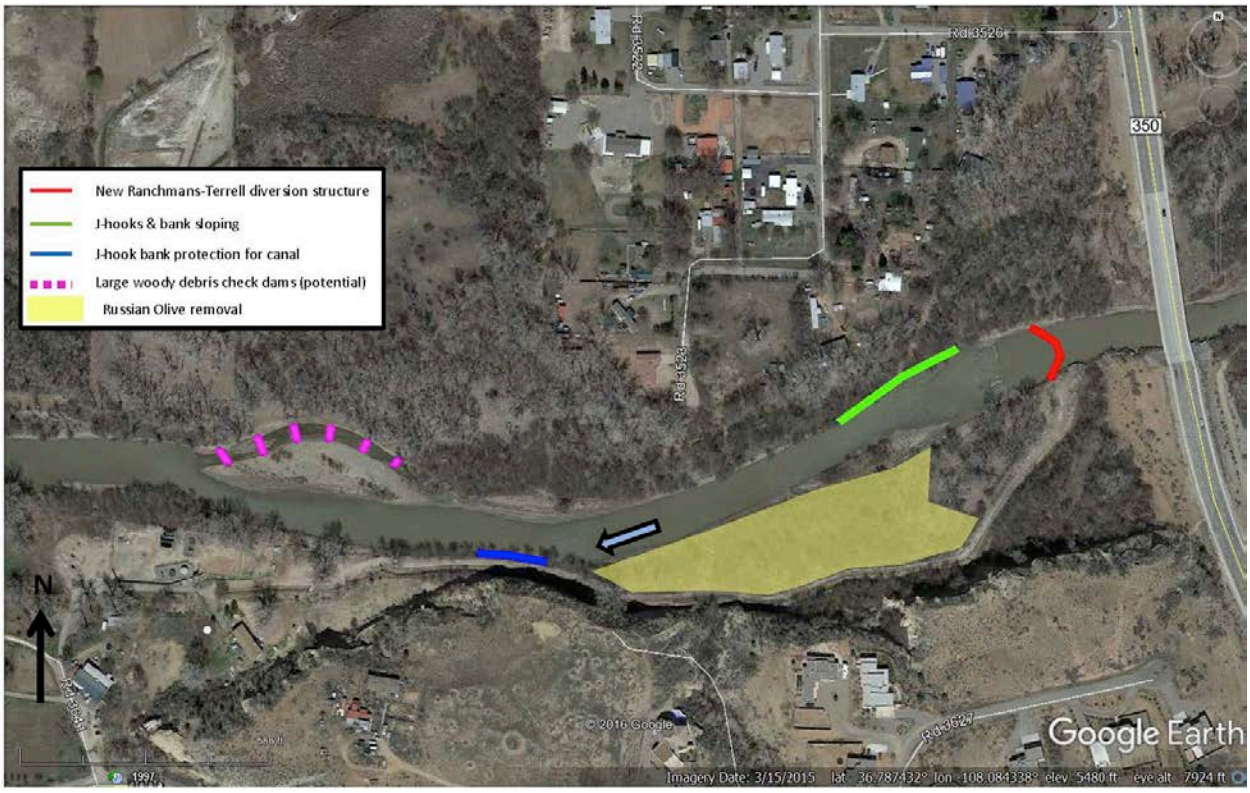

Figure 1.5.2: Map of proposed BMPs for the Flora Vista – Irrigation Diversion Replacement and Riparian Restoration Project.

All five items listed above are not yet fully funded. Funding sources include a Watersmart Phase 2 Grant from the U.S. Bureau of Reclamation (BOR), Section 319 funds awarded pursuant to this agreement with NMED, approved 2017 San Juan County Non-Native Phreatophyte Control funds from the State of New Mexico, and nonfederal BHP Billiton Settlement Agreement funds provided to SJSWCD for SJWG to fund BMPs for pollutant sources identified during the Microbial Source Tracking study. The BOR funds will be awarded depending on the outcome of a recent grant application by the Animas Watershed Partnership and SJSWCD, and all other funding sources are approved.

If the BOR application is successful, the Watersmart Phase 2 Grant will fund Element 1 (Diversion Structure) and element 3 (Southern bank protection). SJSWCD will fund Element 2 (Russian olive removal) with San Juan County Non-Native Phreatophyte Control funds. Element 4 (J-hooks and bank protection for northern bank) will be funded with a combination of Section 319 funds and funds currently available from the BHP Billiton Settlement Agreement. If Elements 1-4 cost less than estimated, Element 5 (check dams) will be funded with a combination of these funding sources, pending final approval from the granting entities. Care will be taken to make sure all match requirements are met – matching funds will be used once, and the two federal grants and not used to match each other.

If the BOR application is not successful, then SJWG and SJSWCD will fund Element 1 (Ranchmans – Terrell Diversion Structure) using a combination of Section 319 funds under this agreement and funds from the BHP Billiton Settlement Agreement, and SJSWCD will fund Element 2 (Russian olive removal) with San Juan County Non-Native Phreatophyte Control funds. Elements 3-5 would not be completed. Proper construction of the diversion structure will have the single greatest pollutant load reduction and overall benefit to the Animas River of any of the project elements, and Elements 1 and 2 are expected to be fully functional without the other elements being completed.

The effectiveness of each of the five elements will be assessed through surveys of fluvial geomorphology and topography, and/or repeat photo points (see data collection elements in section 2.2.3). Based on preliminary STEPL calculations, bank stabilization associated with elements 3 and 4 (470 feet of eroding active channel bank) should result in a reduction of 190 tons/year sediment, 310 pounds/year Nitrogen, and 114 pounds/year Phosphorus (with the potential for an additional 500 feet of secondary channel bank under Element 5 if funding is available). Additional benefits would be the long-term stabilization of active flood plain areas within a reach in which an irrigation diversion improvement project is to occur. Replacing the existing gravel push-up Ranchmans-Terrell diversion system that needs to be rebuilt three to five times per year with a permanent large rock cross vane structure(s) will result in significantly less channel bed and bank disturbances; an estimated sediment load reduction of 216 to 260 tons/year. Calculation of sediment and nutrient reductions from these actions will be refined based on measurements gathered during the topographical survey, such as dimensions of stabilized banks.

Management Project 3 – E1 Riparian fence, filter strip and streambank stabilization along Animas River

The LAWBP Section 4 Pollutant Source identifies irrigated pasture as a significant source of *E. coli* bacteria when livestock are kept in close proximity to riparian areas with direct access to the Animas River. LAWBP Section 5 Projects identifies direct deposit of livestock manure into waterways as one of the most straightforward pollutant sources to address. This project will occur on a 47 acre ranch with 300 head of beef cattle, irrigated pasture and direct cattle access to the Animas River along 600 feet of river bank that is eroding due to direct cattle access. A field drain that drains about 1/3 of the ranch discharges to the Animas River along the bank. This property was identified as a priority site during the inventory of winter livestock pasture in 2016. The property is located in the Estes Arroyo HUC. This project aims to reduce bacteria and nutrient contributions to the Animas River by limiting the direct access of cattle at this site.

At the upstream (eastern) end of the property, a 110 ft. by 20 ft. area was excavated several years ago. The excavated bench is approximately 3 ft. below the agricultural field elevation and 2 ft. above the low water elevation. It currently supports wetland grasses and shrubs that are heavily grazed which prevent them from becoming more than a few inches tall. This project would extend the bench feature downstream approximately 140 ft. before having to transition into a narrower 110 ft. long section with only bank re-sloping due to the presence of a natural gas facility. A field drain currently discharges directly into the river just downstream of the existing bench feature. This project would disperse this agricultural field runoff within the existing and proposed excavated bench features to facilitate nutrient

uptake and sediment removal while also augmenting its hydrology to sustain riparian vegetation.

Fencing will be placed at the top of slope of the bench and bank sloping areas (i.e., agricultural field elevation) to exclude livestock access and grazing. This exclosure fencing will encompass approximately 7100 sq. ft. (0.16 acres) and 370 lineal feet of river bank from. Of this 7100-sq. ft., approximately 4900 sq. ft. (0.11 acres) and 260 feet of riparian area will be created. Livestock will have access to the river at the downstream end of the fenced area where the water remains deep even during low flows which prevents them going beyond the provided watering area and into the proposed riparian filter strip area.

The effectiveness of this project will be assessed through hydrological surveys, repeat photo points, and vegetation surveys conducted before and after remediation (see data collection elements in section 2.2.3). Based on preliminary STEPL calculations, the riparian fence and filter strip (300 head of cattle and 47 acres of irrigated pasture at a 75% removal efficiency) should result in a reduction of 8.21×10^{12} cfu/year, *E. coli*; 2.35 tons/year sediment; 29.61 pounds/year Nitrogen; and 4.7 pounds/year Phosphorus. Calculation of nutrient reductions from this project will be refined after construction using the dimensions of filter strip and installed fencing.

Management Project 4 –FV3 Four Corners Equine Rescue Manure Management

The Four Corners Equine Rescue is a non-profit organization that rescues, rehabilitates and trains abandoned and wild horses for adoption. The Rescue has 45 to 50 horses on a 5-acre lot that is located about 500 feet north of the Animas River in the Flora Vista HUC. This property was identified as a priority site during the inventory of winter livestock pasture in 2016 due to the high concentration of horses and bare, heavy clay soil that limits water absorption and causes high levels of stormwater and snow runoff that contains high concentrations of manure, *E. coli* bacteria, and nutrients.

The LAWBP (Section 4 Pollutant Sources) identifies Hobby Farms as a significant land use activity within the watershed and source of *E. coli* bacteria. The concentration of horses at this property exceeds that of typical hobby farms and stands out as one of the highest priority sites for remediation. Currently, manure is collected manually by volunteers who transport it to two on-site locations. The manure is collected into large open piles subject to rain and snowfall generating significant runoff during those events. The piles are periodically removed and transported to the regional landfill for disposal. The goal of this project is to reduce the potential of this site to contribute bacteria and nutrients to the Animas River.

In order to manage the manure generated by the horses, the Four Corners Equine Rescue will develop a Conservation Activity Plan (CAP) with the USDA Natural Resource Conservation Service (NRCS) as part of an Environmental Quality Incentives Program (EQIP) project. The CAP will address manure management and operation including proper storage facilities, roadway and walkway improvements, drainage and other appropriate conservation practices to minimize surface and ground water pollution and improve soil conservation. The manure storage structure(s) will be designed to be impervious, prevent the inflow of stormwater runoff and be roofed to exclude rain and snow. This will effectively manage on- site accumulated manure until disposal of at the regional landfill. EQIP is a cost-share program that only pays for completed practices. This grant will fund the Four Corners Equine Rescue portion of the cost- share.

The effectiveness of this project will be assessed through repeat photo points taken before and after remediation (see data collection elements in section 2.2.3). Based on preliminary STEPL calculations, this action (45 horses at a 75% removal efficiency) should result in a reduction of 6.2×10^{10} cfu/year *E. coli*; .25 tons/year sediment 3.35 pounds/year Nitrogen; and 0.5 pounds/year Phosphorus.

1.6 Quality Objectives and Criteria for Measurement Data (EPA QA/R-5 A7)

1.6.1 Objectives and Project Decisions

The purpose of this section is to specify the level of quality needed to make decisions regarding the success of the project. Many of the tasks associated with this project can only be evaluated anecdotally and the quality of the information used for this assessment will be ensured as indicated in the following data quality categories:

Precision - Duplicate or replicate sampling will not be performed as part of this project. However, precision will be ensured by consistently assigning the same people the responsibilities of collecting, recording and analyzing data.

Accuracy - No known reference value available. Accuracy is based on the use of best-available methods, however no studies have been done showing that vegetation surveys or soil monitoring accuracy can be assured.

Bias - Bias will be minimized by using professional and experienced staff to collect and analyze data. Both MSI and Basin Hydrology staff have extensive experience with the methods listed in this document. See Section 1.4 for details.

Representativeness - Each sampling event, for each method listed, will be considered a complete event and no subsets will used. Since temporal change is being documented with the proposed methods, a sample is only representative of the site where data was collected.

Comparability - Vegetation, hydrological and soils monitoring employ established methods that can be compared to other data collected with same methods.

Completeness - . Surveys will only be considered complete if all required data outlined in the QAPP have been collected. Partial surveys will not be accepted. Full, complete surveys are essential to be able to effectively assesses changes pre- and post- construction.

Sensitivity- Pre and post-construction geomorphic data will be collected and evaluated using natural channel design principals to demonstrate that the site modifications produce the results identified in the project's goals. Additionally, pre- and post-construction photos and vegetation surveys will provide qualitative and quantitative data to assess the successfulness of restoration efforts.

1.6.2 Measurement Performance Criteria/Acceptance Criteria

The measurement quality objectives will be sufficient to achieve the Data Quality Objectives and will be in compliance with SWQB. Data will be collected by staff competent in the methods outlined in this document. Data will be accepted only if it meets the standards, for each method, listed in the document. Final datasets will only be accepted if they contain pre- and post-construction monitoring. All collection events will have two or more project staff present to ensure appropriate methods and to verify data collected in the field. In the absence of a second staff member for field work, the Project Coordinator or SJSWCD representative will participate in collection events.

1.6.3 Completeness and Comparability

All data gathered will be collected in accordance with the methodologies outlined in sections 2.2.1, 2.2.2, 2.2.3, and 2.2.4 of this QAPP. In order to be comparable with other data collected for this study (pre- and post-construction), all data will be collected in accordance with the aforementioned methodologies (e.g., EPA 2002; EPA 2016).

1.7 Special Training Requirements/Certification (EPA QA/R-5 A8)

The contractor for vegetation monitoring will be required to have a bachelor's degree related to biology, botany, or conservation. The contractors and subcontractors must have experience collecting vegetation data using the techniques listed in this QAPP.

The contractor approved for geomorphologic monitoring needs to have demonstrated survey skills and a background in fluvial geomorphology, which could include university coursework, experience/training in riparian/wetland/stream ecology, familiarity with channel evolution concepts and models, or a successful project design and implementation track record in which determining the natural potential of a site was documented with professionally accepted methodologies.

Contractor qualifications will be documented through resume and professional references. The qualification will be reviewed by the SWQB Project Officer for this project. The documentation of this information will be kept in the SJWG project files managed by the Project Manager.

1.8 Documents and Records (EPA QA/R-5 A9)

Copies of this QAPP and any subsequent revisions will be provided to all individuals included on the distribution list by the SWQB Project Officer. The SWQB Project Officer will also distribute all applicable protocol documents and subsequent revisions used throughout the project to the appropriate contractors. Project documents include this QAPP, vegetation monitoring results, hydrologic monitoring, fluvial geomorphology surveys, and equipment maintenance logs. (Table 1.9). Using a file sharing software such as Dropbox, monitoring contractors will submit all field logs, datasheets, digital data, and photographs to the Project Coordinator digitally. The Project Coordinator will then submit all pertinent documents to the Project Officer. Documents will be maintained in accordance with the requirements of the QAPP.

Table 1.8: Reporting Format and Storage

Monitoring Technique	Reporting Format	Storage Location and Time
Vegetation Monitoring (line-point intercept (EPA 2002; Herrick 2005))	Data recorded on project specific field sheets and spreadsheets. Reported in monitoring report attached to final report.	Paper copies in project file, electronic copies on file sharing software and backed up on hard drive at San Juan SWCD and SWQB.
Hydrological Properties including depth to shallow groundwater.	Data recorded in field book. Reported in monitoring report attached to final report.	
Topographic and Fluvial Geomorphologic measurements	Data recorded in any professionally accepted field note form (laser level data collection) or text file (total station data collection).	
Repeat Photography (all aspects of project) (EPA 2016)	Paired photopoints included in final report.	

2.0 DATA GENERATION AND ACQUISITION

2.1 Sampling Design (Experimental Design) (EPA QA/R-5 B1)

2.1.1 Restoration Design Background and Strategy

A "natural function" approach to design seeks to identify the stable geomorphic dimensions of a channel, adjacent flood plain, and wetlands and then incorporate those characteristics into designs to meet specific objectives. Using available reference conditions and conducting an assessment of project area conditions, it is possible to closely match the central tendencies of a naturally functioning system which results in a design plan that works with existing conditions, rather than against them. The natural function design approach involves four distinct steps:

1. Characterization of existing physical and biological parameters,
2. Identification and characterization of reference conditions that represent the full potential of the system,
3. Evaluation of existing conditions against reference conditions to determine enhancement needs, and
4. Development of specific design prescriptions to move the system towards the reference conditions.

This approach to design achieves greater success at less maintenance cost.

The overall goal of this plan is to develop a monitoring program that is capable of tracking change within the project site from pre-restoration condition to post-restoration condition and evaluate the effectiveness of the project's principal goal of restoring channel bed stability, improving water quality of agricultural field drains and runoff from a concentrated equestrian facility. The monitoring program should also be straightforward and simple enough to track project success without overwhelming data analyses or complicated procedures prone to error. Monitoring protocols described in this plan are designed to be conducted for the duration of the grant (short-term). However, the methodologies lend

themselves to long-term monitoring as well and can be utilized if other additional resources are available.

The monitoring components to be employed are: 1) vegetation monitoring 2) hydrology monitoring, 3) fluvial geomorphologic monitoring, 4) photographic documentation. The rationale, methods, data to be collected, and equipment are described for each component.

Vegetation monitoring will be conducted on a portion of the restored areas to track progress and determine revegetation success and this monitoring does employ a specific sampling design. Geomorphology monitoring and repeat photography will also occur before and after implementation; however; no sampling design is used due to the fact that the monitoring and photography will occur directly at the implementation sites.

2.1.2 Sample Locations

Monitoring activities will vary by management project (Tables 2.1.2a and 2.12b).

Table 2.1.2a: Monitoring activities at restoration project locations.

Management Project	Name	Vegetation	Photo Points	Hydrological	Fluvial Geomorphology
1	Lower Animas Irrigation Ditch Siphon Crossing at Knowlton Arroyo		x		x
2	Ranchmans Terrell Diversion Improvement and Flora Vista River and Riparian Restoration		x		x
3	Riparian fence, filter strip and streambank stabilization along Animas River	x	x	x	
4	Four Corners Equine Rescue Manure Management		x		

Table 2.1.2b: Monitoring activities: time-period, target condition, and quality control components.

Monitoring Type	Time period	Target Condition	Quality Control Components
Vegetation	August – September	Grass seed-heads; mature forbs	Replicable: consistent survey team between monitoring events, fixed survey points recorded with GPS and demarcated with stake; use of tripod at established height to ensure photos are comparable between surveys.
Photo Points	August – September	Mature vegetation	
Hydrological	August – September	Low flow conditions	
Fluvial Geomorphology	August – September	Low flow conditions	

2.1.3 Inability to Collect Data

Contractors will discontinue monitoring and survey activities should weather or environmental condition pose a risk to project staff or participants. Should adverse conditions persist collection activities will be ceased. Missing data will be mitigated in accordance with *Section 4*.

2.1.4 Sample Times/Frequency

Monitoring will be conducted pre- and post- restoration activities. One survey will be conducted prior to restoration and surveys will be conducted post-restoration. Surveys will be scheduled during a window from August to September to coincide with mature vegetative conditions (ensuring successful plant identifications) and during low flow river levels (for representative topographic surveys). Post-restoration surveys will occur during the August to September window in 2018 (one growing season after restoration) and in 2019 (two growing seasons after restoration). Survey schedule will adapt in the event of circumstances out of our control (e.g., flood, weather event). Post-construction data will be collected for one year in 2020 for Management Projects 3 and 4; a second year of monitoring may be conducted after the end of this project with a separate funding source.

2.2 Sampling Methods (EPA QA/R-5 B2)

2.2.1 Vegetation Monitoring

<u>Management Project 3: Riparian fence, filter strip and streambank stabilization along Animas River -</u> Line-Point intercept will be collected using measuring tapes laid on ground between points fixed by rebar (some of which will be the same as the geomorphology cross section markers, and marked using the same protocol). Observers will walk from the zero end of the transect and take measurements at every 2.5 feet interval. The pin flag gets dropped at each designated point and all plants, litter, rocks, and soil (clay, sand, etc.) touching the pin flag get identified to the functional group level starting with the top most level. This monitoring will be conducted both pre- and post-project implementation. The *Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems*, developed by the Jornada

Experimental Range in cooperation with the US EPA, NRCS, and BLM, establishes the protocols for this vegetation data gathering (Herrick et al. 2005). Vegetation data will be gathered by the use of the line intercept method. Transects will be established at each site with one end marked with rebar. Each species that intercepts the line will be recorded and the distance of each species, as it intercepts the line, will be recorded. These data will enable the determination of species richness and the cover and abundance of each species. These data will be compared pre- and post-construction.

2.2.2 Hydrologic-Topographic Monitoring

Management Project 3: Riparian fence, filter strip and streambank stabilization along Animas River - Grading and revegetation efforts are designed to convert a portion of an upland agricultural field along a section of the Animas River with steep and poorly vegetated banks to a stable concave wetland-riparian bench to treat agricultural field runoff prior to entering the river system. An existing wetland-riparian "reference" feature exists immediately upstream of the project area. Topographic monitoring techniques will be used to monitor the site hydrology. Ground elevations in this reference area will be surveyed and compared with the elevations of the upland bank and agricultural field within the project area. The lowering of the agricultural field area elevation to match that of the reference area elevation will provide the appropriate setting to: intercept shallow ground water along the river, be inundated by the Animas River during moderate and high discharges and, capture, disperse and vegetatively treat runoff from the agricultural field.

Topographic surveying will employ standard field hydrology and geomorphic vertical and horizontal methods. A laser level and rod will be used to determine elevations (accuracy to within 0.01', recorded to the nearest 0.1', except hub elevations) from project-set benchmarks (one on each end of the project). A line between the two benchmarks will form a baseline from which two to four perpendicular transects will be established. Each transect will extend from beyond the expected agricultural field limit-of-grading to the Animas River edge-of-water. A survey tape will be used to identify the location of individual topographic survey points along each transect. Each transect will contain up to 10 different elevation points to adequately capture the existing ground elevation including important geomorphic features such as field elevation, top of bank, bankfull, edge of water, etc. Transect location will be staked prior to surveying and its baseline stationing recorded, as measured from the downstream to the upstream benchmark. Construction plans, and post-construction topographic monitoring will utilize this same grid-transect system. Scaled topographic plots will be plotted in Army Corps of Engineers' HEC-RAS hydraulic model software. Benchmark, transect locations and various site features will be plotted on a current Google Earth image. Verifying that post-construction ground elevations are those identified in the construction plan will be the basis that the same wetland hydrology conditions will exist at the constructed site as those in the adjacent reference area.

2.2.3 Fluvial Geomorphology

Management Project 1: Lower Animas Irrigation Ditch Siphon Crossing at Knowlton Arroyo - The geomorphologic surveying conducted on this ephemeral water course will utilize Rosgen Level II surveying and recording techniques (Rosgen, 1996) using a laser level for elevations (accuracy to within 0.01', recorded to the nearest 0.1', except hub elevations) and survey tape for distance. This survey will inform the restoration work as it will form the basis for the vertical and horizontal locations of proposed bed and bank stabilization measures. Surveying will consist of two to four cross sections and a

longitudinal profile (channel bed, bankfull and top-of-bank). Scaled topographic plots will be plotted in Army Corps of Engineers' HEC-RAS hydraulic model software. Geomorphic parameters such as channel bed and bankfull slope, bankfull cross sectional area and bankfull width will be calculated. Due to urban encroachment at this site, only channel bed stabilization measures are practical to prevent exposure and failure of the buried siphon crossing.

The following procedures are used to survey cross-sections: The endpoints of each cross section will be monumented with a 12" wooden survey hub driven to within 1" above the ground surface. These hubs will be driven into each top of bank as allowable by road, driveway, housing constraints adjacent to the site. The cross sections will be placed perpendicular to valley slope. GPS coordinates will be recorded for each hub, plotted on a Google Earth image. One hub will be established, and identified, as the project elevation control point. A copy of the survey field notes will be provided. Field note format will per recognized professional surveying standards.

A longitudinal profile of the channel where the siphon crossing occurs will extend from approximately 100 feet downstream of the downstream-most cross section to 100 feet upstream of the upstream-most cross section to determine channel bed characteristics through the reach.

Monitoring: Monitoring will consist of hydrologic observations noting the occurrence of any high flows since last site monitoring, signs of siphon and bank maintenance, channel bed scour or deposition, new bank erosion within the project reach, and fence structure stability and condition

Management Project 2: Ranchmans Terrell Diversion Improvement and Flora Vista River and Riparian Restoration – This project will be surveyed using either a robotic or manual total survey station. Regardless, survey methods will utilize Rosgen Level II surveying methodology to identify important channel bed, bankfull location/elevation, top of bank, etc. features in both the cross sections and longitudinal profile. Four to six channel-wide cross sections will be completed with each cross-section end point monumented by a wooden survey hub. One hub will be identified as the elevation benchmark for the survey. The longitudinal profile will extend upstream to the CR350 Bridge and downstream at least 400 feet downstream of the existing heading structure to adequately document channel bed elevations near the heading structure.

In addition to channel surveying, the diversion system including the heading structure (elevation and length of headwall, diversion pipe invert elevation, pipe size and length) and diversion ditch (water elevation and numerous mini cross sections) will be surveyed from the heading downstream to the ditch's Parshall flume measuring device.

The survey data will be imported into Autocad to create a site map of the project area. Cross sections, longitudinal profiles, bankfull, top of bank, etc. locations will be shown with an aerial photograph base map. Scaled plots of the cross sections and longitudinal profiles will also be prepared.

The survey data (acreage and linear feet of bank stabilization) can be fed back into the STEPL model, to refine, the estimate of sediment load reduction post construction.

The channel and ditch cross section data will be entered in the Army Corps of Engineers' HEC-RAS hydraulic model software for hydraulic modeling purposes. Discharge values low flows up to the 5-year

recurrence interval will be modeled for the Animas River cross sections and up to 8.6 cfs for the diversion ditch. A flood frequency curve for annual peak discharges for the upstream U.S. Geological Survey gaging station "Animas River below Aztec, NM" will be generated using annual peaks for the station's period of record using standard Log Pearson Type III methods (USGS, 1982). Low flow data will be obtained from this gaging station's Monthly Statistics webpage.

Hydraulic modeling will be used to estimate what the existing Animas River elevation-discharge needs to be for the full diversion rate to occur at the ditch's Parshall flume. Based on backwater analysis of the diversion ditch with 8.6 cfs between the Parshall flume and heading, the elevation of the in-channel diversion structure in the Animas River can be set. Once the diversion structure elevation is known, and the best site for the structure is determined (based on structure height relative to bed elevation and bankfull elevations, bed materials, channel width, access, etc.), modeling of the structure at the determined elevation and location can be performed to evaluate its hydraulic effects on this reach. Modifications to its location and-or elevation, and subsequent hydraulic modeling, may be required to reduce adverse in-channel hydraulic effects.

Monitoring: Monitoring will consist of geomorphic observations noting the occurrence of high flows since last site monitoring, signs of structure instability, evidence of heading or structure maintenance, evidence of recent bank erosion or in-channel deposition.

2.2.4 Repeat Photography

Evaluating change over time by using repeat photography provides insight into the relative success of restoration efforts. Photo monitoring goals will include demonstrating an increase in native wetland vegetation and a decrease in upland vegetation.

Methods: Photo point monitoring will follow methodologies outlined by the EPA (2016). Photo points will be set up at several locations within each project area to capture changes over time. Photo point markers will be carefully located and monumented with rebar pins or wooden survey hubs. All photos will be standardized for height, lens angle, and direction, which will be recorded in the metadata of each photo point. Photo heights will be standardized by the use of the same tripod type for all photos. Locations will be recorded with a GPS unit. These photos will provide a broad view of the site. The azimuth and date of each photo from each photo point will be documented. Repeat photographs will be captured from the same locations using the same azimuth.

Data: Pre-construction, as-built, and annual repeat photographs will document changes to general site characteristics. Post-construction photos will be taken at the same time as the post-construction vegetation surveys; two years, in mid to late summer of 2018 and 2019. Post-construction data will be collected for one year in 2020 for Management Projects 3 and 4; a second year of monitoring may be conducted after the end of this project with a separate funding source. Photos selectively placed at representative areas throughout each project site will provide a visual documentation of stabilization efforts, structure stability and vegetation establishment.

Equipment: Digital camera, compass, GPS unit, rebar pins/wooden survey hubs.

2.3 Sample Handling and Custody (EPA QA/R-5 B3)

No physical samples will be obtained as part of the implementation of this project and therefore, no handling requirements are needed. All data collected are maintained in paper or electronic copies that are provided to the SWQB Project Officer and maintained in the project file. Data will also be maintained by the Project Coordinator and individual contractors; MSI and Basin hydrology.

2.4 Analytical Methods (EPA QA/R-5 B4)

Sample analysis will not be conducted as part of the implementation of this project and therefore no analytical methods are needed.

2.5 Quality Control Requirements (EPA QA/R-5 B5)

Quality control (QC) activities are technical activities performed on a routine basis to quantify the variability that is inherent to any environmental data measurement activity. The purpose for conducting QC activities is to understand and incorporate the effects the variability may have in the decision-making process. A high level of quality, precision, and replicability will be ensured by implementing the following practices: a) consistent staff members between monitoring events to reduce potential variability; b) verification of completeness of field forms before leaving field site; c) documentation of site conditions during each survey event to assist with the evaluation of any anomalies that occur in the data; d) demarcation of photo and survey points with fixed hard points, such as a stake, and recorded GPS locations to ensure replicability; and e) use of a tripod at an established height and azimuth to ensure each photos are comparable between surveys.

Field QC of data irregularities and verification of completeness will be performed by project staff at the time of data collection. All field data will be submitted to the Project Coordinator, as soon after collection as possible. All sampling events will have two or more project staff on site to ensure proper methods are followed. Analyzing replicate data and checking measurement precision will be the responsibility of the SWQB Project Officer and SJWG Project Coordinator. If it is discovered that monitoring methodologies must deviate from the approved QAPP, a revised QAPP must be approved before work can be continued.

2.6 Instrument/Equipment Testing, Inspection, and Maintenance (EPA QA/R-5 B6)

2.6.1 Field Measurement Instruments/Equipment

The scientific instruments used to collect physical measurements include a survey device (e.g. laser level, autolevel, or total station depending on the contractor), global positioning system unit (GPS), meter tapes, compass, camera, and field forms. All field equipment will be inspected prior to each sampling trip. All instruments and equipment will be tested, inspected and maintained in accordance with the manufacturer's specifications as included in the associated instrument/equipment manual.

2.6.2 Equipment Testing Criteria, Frequency, and Responsibility

Before each collection effort, vegetation, hydrologic, or topographic, project staff will test electronic equipment in accordance with manufactures guidelines. Maintenance logs are maintained for all

contractor instruments and equipment. Consultants will use their own equipment. Results of equipment inspections will be noted in the maintenance log and/or project file.

All electronic equipment will be charged immediately after use. All electronic equipment, including backup equipment, will be checked one day prior to use to ensure full charge and spare/backup batteries are available.

2.6.3 Equipment Failures or Deficiencies

When feasible, project staff will have spare equipment while on site in case of failure or defect. Any deficiencies in equipment will be noted and reported immediately. If condition of equipment is in doubt, it will not be used.

2.7 Instrument/Equipment Calibration and Frequency (EPA QA/R-5 B7)

Instrument calibration and frequency will be done in accordance with manufacturer's specifications and documented on the field sheets, which will be included in final monitoring reports.

2.8 Data Management (EPA QA/R-5 B10)

Data obtained for this project are maintained in paper and electronic files. Within forty-eight hours of collection, field data will be entered into spreadsheet form (e.g., Excel) by the project staff associated with each collection/monitoring type; MSI or Basin Hydrology. Data will then be delivered to the Project Coordinator, who will review the data and then submit to the Project Officer. Data will also be submitted to MSI for inclusion in STEPL modeling. STEPL results will be sent to the Project Coordinator and Project Officer for review. These data are maintained in the project file, file share software, and backed up on SJSWCD hard drives. SJSWCD will archive all data sheets and digital files. . Project staff will prepare a summary report of each monitoring event and submit to the Project Coordinator when data is submitted.

3.0 ASSESSMENT AND OVERSIGHT

3.1 Assessments/Oversight and Response Actions (EPA QA/R-5 C1)

3.1.1 Assessment Activities

The SWQB Project Officer provides project oversight by periodically assisting with and/or reviewing data collection efforts. A review of the restoration project occurs on a quarterly basis. The Project Coordinator will submit a quarterly report for the 319 grant to the Project Officer that describes the progress of each task and justifies task tardiness if applicable. Any problems encountered during the course of this project will be immediately reported to the SWQB Project Officer who will consult with appropriate individual to determine appropriate action. All problems will be documented for inclusion in the project file and final report.

3.1.2 Individuals Responsible for Assessment

SWQB and EPA grant managers will have the ultimate authority to terminate operations. Within the project staff, the quality assurance officer, the Project Coordinator, the restoration subcontractor, and vegetation monitoring staff will be in regular communication, and contractors will have the authority, internally, to stop collection or restoration activities should issues arise that inhibit the completion of procedures listed in this document, or impede the safety of subcontractors and project staff.

3.1.3 Assessment Reporting

Data and data summary reports will be submitted by the subcontractors to the Project Coordinator for review. Project Coordinator will work with the monitoring subcontractors to interpret monitoring results and make final conclusions as to the efficacy of the project work, and compile these conclusions into quarterly and final reports to the SWQB Project Officer. Efficacy will be evaluated by assessing re-vegetation success, derived from vegetation surveys, the stability of banks following restoration, derived from repeat photos, and geomorphological changes, derived from topographic surveys. The final data summary will include the assessments made by the monitoring subcontractors as to the survey results and the efficacy of the work.

3.1.4 Corrective Actions

Any corrective actions taken by project staff will be recorded and immediately reported to the Project Coordinator. Should the corrective action impact the project or data quality, the Project Coordinator will alert the Quality Assurance Officer and Project Officer.

3.2 Reports to Management (EPA QA/R-5 C2)

3.2.1 QA Status Reports

The Project Coordinator will produce a quarterly report detailing the activities outlined in this document. The Project Coordinator will also make recommendations for possible modifications to this document, if deemed necessary for the successful completion of this project, when providing status reports.

3.2.2 Report Submission

The project managers and subcontractors will be responsible for submitting status reports to the Project Coordinator. The vegetation monitoring consultant will prepare the vegetation monitoring report for approval by the SWQB Project Officer and Project Coordinator. The Project Coordinator will submit quarterly status reports to the SWQB Project Officer. The SWQB Project Officer will be responsible for the final restoration project report. Printouts, status reports, or special reports for SWQB or U.S. EPA will be prepared on request

3.2.3 Deviations from Monitoring Plans

If deviations from the submitted monitoring plan and this QAPP are deemed necessary as a result of on-the-ground challenges, any such deviations shall be reported to the SWQB Project Office, the Project Coordinator and the SWQB Quality Assurance Officer for review prior to implementation.

4.0 DATA REVIEW AND USABILITY

4.1 Data Review, Verification, and Validation Requirements (EPA QA/R-5 D1)

Data review and verification are key steps for ensuring the integrity, suitability and usability of the data. The SWQB Project Officer will verify data following each data collection event to ensure the correct channel pattern, profile, and dimension are obtained prior to implementing restoration efforts. An elevation point will not be accepted if it appears to be out of the ordinary from the data set.

Two monitoring participants will be present during vegetation monitoring to verify vegetation species determinations. If data are questionable, the consultant will perform this monitoring once again at those locations to confirm or deny original data collected. If a species cannot be identified, a specimen in flower should be collected, pressed, and taken to an expert or herbarium for determination.

No laboratory generated analytical data will be obtained and therefore no validation procedures are required.

4.2 Verification and Validation Methods (EPA QA/R-5 D2)

The Project Coordinator will ensure that valid and representative data are acquired. Verification of field sampling and analytical results will occur in the review of data, performed by the Project Coordinator. Data will then be provided to the SWQB Project Officer for their review, upon request. In the event questionable data are found, the SWQB Project Officer will consult with project personnel to determine the validity of the data. Results of the verification process will be included in the final reports.

4.3 Reconciliation with User Requirements (EPA QA/R-5 D3)

The information gathered under this QAPP will be sufficient to assess the success of BMP projects in reducing sediment loads and improving vegetative cover. Once all data have been verified they will be reported and analyzed and incorporated in the final project report. The final report will evaluate whether data and QC requirements were met throughout the project.

Although beyond the scope of this project, this combination of qualitative and quantitative data and trend information may be used to inform future project design, and may determine if additional monitoring or project work is needed at the sites monitored herein.

5.0 REFERENCES

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